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ABSTRACT

The role of the agricultural extension worker as intermediary between farmer and scientist is studied using the Chaffee and McLeod coorientation model. It is found that the extension workers' cognitions fall between those of farmers and scientists in terms of agreement, understanding, congruency, and accuracy, as predicted. The subjects in the study were 142 rice farmers, 20 extension workers, and six plant breeders in the Philippines. Eleven tables supplement the text. (MS)

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COORIENTATION IN AGRICULTURAL DEVELOPMENT:

THE INTERRELATIONSHIP BETWEEN FARMERS, CHANGE AGENTS AND SCIENTISTS

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Responsibility for this paper is, however, solely mine.

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ABSTRACT

Agricultural development, though primarily concerned with increasing farm productivity, is essentially a social product -- an interactive process which takes place in a social and cultural matrix. Basic to the process are farmers, but other occupational groups are also important.

At the heart of agricultural development is technological modernization. Our interest is in new technology as an outgrowth of problem-solving behavior and in the cognitive and communicative processes related to decision-making -- in an effort to understand more fully why some practices are adopted more readily than others.

The study focuses on the cognitions and the interrelationships and interactions between farmers, extension workers and agricultural scientists. Of central interest is the role of the extension worker. Is he -- in terms of his cognitions -- in a position to serve as an intermediary between farmers and scientists, is he merely a one-way 'messenger,' or is he even completely 'outside' of the system? Do the three groups think of the extension service as an intermediary, and does it -- in fact -- serve in such a capacity?

The tool used to study this relationship is the Chaffee and McLeod coorientation model. It enables us to compare cognitive systems and to determine how the members of one group assess the orientations of members of another group.

The model assumes that each person in a coorienting pair has two distinguishable sets of cognitions: he knows what he thinks, and he has some estimate of what the other person thinks. Regardless of the content of these cognitions, three separate variables can be constructed from comparisons of these sets of cognitions.

One measure, which consists of an objective 'matching' of persons' cognitions is called cognitive overlap. Two special cases of such overlap are agreement and understanding. Agreement involves personal values, while understanding involves relations between objects on specific attributes. A second type of relation consisting of a person's perception of his own cognitions as either similar or dissimilar to other persons is called congruency or perceived agreement. The third relation -- one person's estimate of the other person's cognitions -- is accuracy.

The major hypothesis is that the extension worker occupies an intermediary position -- in terms of agreement, understanding, congruency, and accuracy -- between farmers and scientists.

The subjects in this study were 142 farmers and 20 extension workers --both groups from Rizal province, the Philippines -- and six plant breeders working on the varietal improvement of rice in Southeast Asia. Each of the Ss was asked to coorient -- respond for himself as well as estimate the responses of the other two groups -- on a number of rice production related variables.

The data are generally in the predicted direction. All three of the coorientation measures provide evidence of the extension worker's intermediary role:

--Agreement scores show that the extension worker's cognitions fall between those of the other two groups.

--Congruency scores show that his cognitions are perceived by others to fall somewhere between those of farmers and scientists, and

--Accuracy scores provide indirect evidence of two-way or "diachronic" communication in which the agent serves as an intermediary between scientists and farmers, rather than as one-way messenger carrying messages from the laboratory to the farm.

INTRODUCTION

Technological modernization is the foundation on which agricultural development rests.* Because of this, much effort has gone into attempts at understanding why some technology or innovations are readily adopted, while others are never accepted.

Diffusion researchers have tackled the problem by focusing on the farmer and the behavioral and characterological correlates of adoption-rejection. By considering such variables as mass media exposure, age, education, farm size, income, personality factors, and socio-economic status, one can predict -- within a certain probability range -- who among a target audience is likely to adopt an innovation. This type of research, however, concerned almost exclusively with the personal characteristics of farmers, provides little direct insight into structural correlates of adoption, or into the role of communication in the creation and spread of technology. I suggest that we will not learn much more about diffusion and adoption by simply looking for more characterological variables.

If instead, we begin to look at new technology as an outgrowth of problem-solving behavior and focus our research on the cognitive and communicative processes related to decision-making, we may add to our understanding of why some practices are adopted more readily than others. In doing so, it is important to bear in mind that development is an interactive process which takes place in a social and cultural matrix.

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*While innovations are necessary to the development process, I do not want to suggest that adoption per se is desirable behavior. The widespread of adoption of some innovations can have questionable consequences, i.e. DDT. Similarly, in less developed countries the introduction of mechanization can add to unemployment problems.

As one writer (Mosher, 1966, p. 12) puts it, "Agricultural development is a social product. It is not the result of the work of farmers alone."

Much of the research on agricultural communication, to date, has focused on the individual farmer as though he were an isolated 'actor.' Typically, he has been seen as primarily a receiver in what Thayer (1968, pp. 129-130, 141) calls a 'synchronic' pattern of communication. The product or the output of a synchronic communication encounter is one of 'tuning' another to one's thinking or intentions, or of changing some aspect of the environment through the behavior of the other ... the objective is the achievement of one or the other's intended-state-of-affairs. Thayer contrasts this mode of communication with the 'diachronic' mode in which the objective is the achievement of some mutually advantageous consequence not known in advance by either participant, and the outcome is typically some new insight or comprehendability on the part of one or all participants. In diachronic communication encounters, recognition is made of the fact that agricultural development is basically concerned with problem-solving behavior -- and that many people are concerned with these problems and can make contributions toward their solution.

The present study, in addition to the farmer, focuses as well on the cognitions and behavior of other important actors, i.e. the agricultural researcher and the extension agent, and on the interrelationships and interactions between these three groups. It is assumed that these interactions affect a) the kind of communication that occurs, b) the nature of the agricultural research effort, and ultimately c) the adoption of new technology. I am especially concerned with the role of the extension worker. Is he -- in terms of his cognitions -- in a position to serve as intermediary

between scientists and farmers, is he a one-way 'messenger,' or is he completely outside of the system? Do farmers and scientists think of the extension service as an intermediary, and does it -- in fact -- serve in such a capacity?

To answer such questions, we need to know something about the cognitions -- the thoughts, beliefs, expectations, and knowledge -- of the people who interact to promote agricultural development. What these people do is governed, at least in part, by their cognitive system and their orientations to the environment.

Though supposedly engaged in a common effort in pursuit of a common goal, the respective cognitions or orientations of the three groups under study can be expected to differ. The extent of any differences and similarities in cognitions, it seems, is partly a function of experience.

It is probably also true that the success of any agricultural development effort depends as much on how effectively the three groups work together* as it does on the natural resources with which they begin. How effectively they work together would seem to depend, in turn, on how well they 'know' each other -- how they assess each other's roles and cognitions.

Thus, it is important not only to know the orientations of the three groups, but also their coorientation -- how each assesses the orientations of the other two. The work of both scientists and extension workers will be affected by their notions of how farmers think. Similarly, the farmer's

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*The cooperation between the three groups is probably what has made agricultural extension work in the U.S. so highly successful. "The federal government, state governments, county government, and farming people all sit down together and together analyze the situation, locate the needs, make plans for betterment, and then each in his respective field helps carry the plan to fruition" (Smith and Wilson, 1930, p. 131). In emphasizing these three groups, we do not mean to belittle the importance of such factors as infrastructure, availability of credit, political structure, etc.

relationship to the extension worker will be influenced by what he 'knows' about him.

This paper then is an attempt to develop and test an analytic framework for the study of the coorientation among farmers, extension workers, and agricultural scientists. It is, in a sense a case study of successful innovation in that the objects of orientation are the new rice varieties that helped bring about the 'Green Revolution' in the Philippines.

The diffusion of innovations -- products of organized research -- is central to agricultural development. That this research needs to be problem-oriented is fairly well agreed upon. The question is -- on the basis of what information do the parties decide together which problems are to be studied? To what extent is the farmer an actor or a spectator in this decision-making process? And, where does the professional communicator fit into this system?

In other words, to understand more fully the nature of new technical knowledge and its acceptability to the farmer, we need to go back and look at the origin of the inquiry process that produced it. Does the research have its roots in the rural problematic situation? What kind of interaction takes place between the farmer, extension worker, and agricultural scientist in the process of creating new technology?

In terms of adoption, it makes the extension worker's job not merely one of persuading the farmer to accept a new practice, but rather one of interacting with him to 'find out' whether it is acceptable -- as a solution to an existing problem. The concept of perception -- as it helps determine a person's reaction to a situation -- is a key dimension to this view.

How people perceive each other, how well they are able to put themselves in somebody else's place, is central to the problem of effective communication. The best way that has been found so far to study this problem is with the Chafee and McLeod (1969) coorientation model (Figure 1) which allows for a comparison of cognitive systems It also allows for the determination of how the members of one group assess the orientations of members of another group.

The model assumes that each person in a coorienting pair has two distinguishable sets of cognitions: he knows what he thinks, and he has some estimate of what the other person thinks. Regardless of the content of these cognitions, three separate variables can be constructed from comparison among these sets of cognitions.

One measure, which consists of an objective 'matching' of persons' cognitions is called cognitive overlap. Two special cases of such overlap are agreement and understanding. These are comparable to the distinction Carter (1965) makes between the two possible sources of object value -- saliences and pertinences. Agreement involves personal values or saliences, while understanding involves relations between objects on specific attributes -- Carter's pertinences.

A second type of relation consisting of a person's perception of his own cognitions as either similar or dissimilar to other persons is called congruency or perceived agreement. The third relation -- one person's estimate of the other person's cognitions -- is accuracy.

In any coorientation situation, there is one potential measure of overlap, and two each of congruency and accuracy since these concepts can be assessed separately from each person's viewpoint.

The coorientation model yields numerical data that allow for a graphical representation of the relationship between farmers, extension workers and agricultural scientists. If we think of each group's orientation as a point, then we can represent the coorientation between the three groups with a triangle.* Most of the hypotheses are derived directly from the geometry of this triangular relationship.

Figure 2

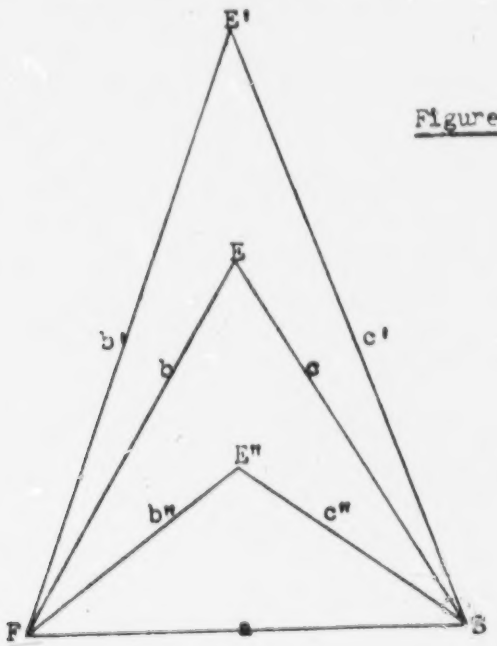

Figure 2

The major hypothesis is that the extension worker occupies an intermediary position -- in terms of agreement, understanding, congruency, and accuracy -- between farmers and scientists. The figure illustrates three possible positions.

At point E, the extension worker is in a 'neutral' position -- he is equidistant from the farmer and the scientist (a=b=c). At E', he is 'outside' of the system -- farmers and scientists are closer to each other than is the extension worker to either of them (b'=c'>a). At E", he is in

*If all three groups were to have exactly the same orientation, then their coorientation could be represented by a single point.

an intermediary position -- the extension worker is closer to both farmers and scientists than those two are to each other ($b''=c''<a$).

Essentially, the hypothesis of the extension worker as an intermediary, in terms of the triangle in Figure 2, is that $b''+c''<a+b''$ and $b''+c''<a+c''$.

METHOD

The farmer sample (N=142) was drawn from three neighboring towns in the province of Rizal, Philippines. The selection was on a random basis from a list of farmers maintained by the Agricultural Development Council of Rizal (ADCR). Where farmers in the original sample could not be contacted, neighbors were interviewed.

The extension workers (N=20) interviewed included all those who were working with rice producing farmers in Rizal province.

The scientist sample (N=6) is small, but includes all of the plant breeders working on the varietal improvement of rice in the Philippines at the time of the study.

Each of the Ss was asked to coorient - respond for himself as well as estimate the responses of the other two groups - on a number of rice production related variables.

Variables included the number and type of characteristics perceived as relevant to varietal selection; a rank ordering of 10 given varietal characteristics; a rank ordering of preferences for five rice varieties; predictions of future average rice yields in the area; and the number and type of problems perceived in rice production. In addition, to gather data on levels of understanding, Ss were asked to compare five varieties on 14 specific varietal characteristics.

Sample questions are:

1. In your opinion, which of the following rice varieties is best, second best, etc.? In other words, please rank the five varieties according to your preference for growing them.

a. Now try to imagine yourself in the place of an extension worker. Which of these five varieties do you think he would consider as best, second best, etc?

b. Also try to imagine yourself in the place of an agricultural scientist such as is found at the U.P. College of Agriculture, the Bureau of Plant Industry or the International Rice Research Institute. Which of these same varieties do you think he would consider to be best, second best, etc?

2. How would you compare the following five rice varieties, grown under normal conditions with adequate water, in terms of yielding ability?

Because of the nature of the data, mostly non-parametric tests had to be used in the data analysis.

RESULTS

a. Cognitive overlap: agreement

One hypothesis, basic to the study, is that people with dissimilar experiences and occupational roles will tend to form dissimilar cognitive systems. The test for this is the one-way analysis of variance. Two variables were used in this analysis: the number of characteristics perceived as relevant to varietal selection, and predicted future yields. The data (Tables 1 and 2) show significant differences between groups -- providing some limited support to the hypothesis that farmers, extension workers, and scientists have formed distinct group orientations.

If the extension worker performs as an intermediary, we would expect to find that his orientations would resemble those of farmers and scientists much more than these groups would resemble each other. The data, summarized in Table 3, lend support to this hypothesis.

There are, though, what may be important exceptions. In terms of the ranking of varietal characteristics according to their relative importance

in varietal selections, the least agreement is found between extension workers and scientists. Also, in the ranking of varieties, the greatest agreement is between farmers and scientists.

Both the summation of 'crude' scores and of the scores which indicate relative 'distances' between groups give essentially the same results. They show the least agreement between farmers and scientists, and approximately the same levels of agreement between farmers-and-extension-workers and between extension-workers-and-scientists.

b. Cognitive overlap: understanding

Data on 'what the facts are'* or understanding are summarized in Table 4. They support the hypothesis that understanding will be lowest between farmers and scientists.

On six of the 14 pertinence relations farmers (pest resistance, plant height, price, maturity, grain weight, dormancy) 'agree' most with extension workers. On five pertinence relations (fertilizer response, yield, lodging resistance, eating quality, tillering capacity) farmers 'agree' equally well with extension workers and scientists. Farmers agree most with scientists on three pertinence relations (disease resistance, cost of production, threshability). Totaling across the 14 pertinence relations show the greatest difference between farmers and scientists.

A comparison of the comparative levels of understanding of pertinence relations (Table 5) shows essentially the same results.

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*While the determination of pertinence relations is objective, the concept as it has been operationalized in the present study has no ascertainable 'true' or 'false' answer. Ss were asked to rank rice varieties on a number of characteristics -- many of which are influenced by such situational factors as climate, soil fertility and cultural management. And, since Ss did not observe these varieties under the same conditions, their responses cannot be compared in terms of any 'right' or 'wrong.'

c. Congruency

The congruency hypothesis was that all three groups would tend to perceive relatively greater agreement between extension workers and the other two groups than between farmers and scientists. The data are summarized in Table 6.

Farmers and scientist appear to perceive the relationships as hypothesized. Each of the two groups perceives itself to be more in agreement with extension workers than with the other group.

The data of extension workers are more difficult to interpret. In terms of the crude score total, they seem to perceive the least agreement between farmers and scientists -- in support of the hypothesis. On the other hand, the total of the scores that indicate relative distances between groups suggest that extension workers perceive the least agreement between themselves and scientists -- not in support of the hypothesis.

d. Accuracy

The accuracy data are summarized in Table 7. They provide strong support for the notion that extension workers play an intermediary role between farmers and scientists.

As hypothesized, both farmers and scientists are more accurate about extension workers than about each other. Another hypothesis, that extension workers will be more accurate about farmers than farmers will be about extension workers, is also supported.

Scientists, however, were not more accurate about farmers than farmers were about scientists. This suggests that whatever "empathic" skills are involved in coorientation estimates are possessed equally by relatively

uneducated farmers and by highly educated scientists. It also suggests that accuracy is more closely related to direct communicative interaction than to level of education or modernity.

Total accuracy scores clearly show that extension workers are the most accurate of the three groups, lending support to the general hypothesis that accuracy increases with increased communicative interaction.

If length of service can also be taken as an index of communicative interaction, there is also some evidence (Table 8) to substantiate the hypothesis that communication leads to greater accuracy. Extension workers with more experience tend to be more accurate about farmers.

There is also some evidence (Table 9) that Filipino scientists are more accurate than non-Filipino scientists about both Filipino farmers and extension workers. Whether or not this is the result of more communication is difficult to tell as these same scientists also tend to agree more with both farmers and extension workers (Table 10).

Chaffee's suggestion that we cannot expect communication to lead to greater agreement is also supported (Table 11). More experienced extension workers do not exhibit any greater agreement with farmers.

DISCUSSION

All in all, there is considerable evidence -- at least in the area covered by this particular study -- that change agents do occupy an intermediary position between farmers and scientists. The interrelationship as it is -- agreement between the three groups -- and how each group thinks it is -- perceived agreement -- is illustrated in Figure 3.

In general, the data are consistent and show that:

- Farmers agree most with extension workers, think they agree most with extension workers, and are most accurate about extension workers.

- Extension workers agree most with farmers, think they agree most with farmers, and are most accurate about farmers.

- Scientists agree most with extension workers, think they agree most with extension workers, and are most accurate about extension workers.

All three of the coorientation measures provide evidence of the extension worker's intermediary role:

- Agreement scores show that the extension workers' cognitions fall between those of the other two groups.

- Congruency scores show that his cognitions are perceived by others to fall somewhere between those of farmers and scientists, and

- Accuracy scores provide indirect evidence of two-way or "diachronic" communicaiton in which the agent serves as an intermediary between scientists and farmers, rather than as one-way messenger carrying messages from the laboratory to the farm.

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TABLE 1. Average number of varietal characteristics perceived as relevant to varietal selection

FARMERS	EXTENSION WORKERS	SCIENTISTS
3.03	7.25	9.3

Analysis of variance

Source	df	SS	MS	F	sig.
between groups	2	584	292.00	148.97	(.001)
within groups	165	324	1.96		
total	167	908			

TABLE 2. Average predicted future yields

FARMERS	EXTENSION WORKERS	SCIENTISTS
153	120	67

Analysis of variance

Source	df	SS	MS	F	sig.
between groups	2	45,685	22,842	5.72	(.01)
within groups	148	590,495	3,990		
total	150	636,180			

TABLE 3. Summary of agreement between farmers, extension workers and agricultural scientists

	FE*	FS	ES
1. total number of characteristics perceived as relevant to rice	6.00 (1)	16.00 (3)	10.00 (2)
2. average number of characteristics perceived by each group	4.22 (2)	6.27 (3)	2.05 (1)
3. types of characteristics perceived	93.00 (2)	130.00 (3)	77.00 (1)
4. predicted future rice yields	33.00 (1)	86.00 (3)	53.00 (2)
5. total number of problems perceived in Philippine rice production	8.00 (2.5)	8.00 (2.5)	0 (1)
6. average number of problems	.54 (1)	2.06 (3)	1.52 (2)
7. types of problems perceived	91.00 (1)	135.00 (3)	98.00 (2)
TOTALS:	235.76	383.33	241.57
8. ranking of characteristics	.84 (1)	.66 (2)	.60 (3)
9. ranking of varieties	.30 (3)	.60 (1)	.40 (2)
TOTALS:	(14.5)	(23.5)	(16)

*Refers to agreement between farmers and extension workers.

Most numbers in this table, except for items 8 and 9, are based on "D-scores," so the smaller numbers reflect greater agreement. The two exceptions are Spearman rank order correlation coefficients, so that larger numbers indicate greater agreement. They are not included in the summation of crude scores -- the first and larger of the two totals.

The numbers in parentheses () are 'rough' approximations of the relative agreement between groups on a particular variable -- lower numbers reflect higher between groups agreement.

TABLE 4. Between groups understanding of pertinence relations

*between groups understanding:	FE	FS	ES
fertilizer response	.9 (2.5)	.9 (2.5)	1.0 (1)
pest resistance	.7 (2)	.37(3)	.83(1)
yield	.9 (2.5)	.9 (2.5)	1.0 (1)
plant height	.08(2)	0 (3)	.97(1)
price	.5 (2)	.3 (3)	.9 (1)
lodging resistance	.9 (2.5)	.9 (2.5)	1.0 (1)
eating quality	.9 (2)	.9 (2)	.9 (2)
disease resistance	0 (3)	.4 (2)	.6 (1)
tillering capacity	.9 (2.5)	.9 (2.5)	1.0 (1)
maturity	.9 (1)	.3 (3)	.4 (2)
grain weight	.83(1)	.6 (2)	.23(3)
cost of production	-.4 (3)	.5 (1)	.3 (2)
threshability	.2 (3)	.9 (1)	.5 (2)
dormancy	.9 (1)	.83(2)	.68(3)
TOTALS:	(30)	(32)	(22)

*Based on Spearman rank order correlations.

TABLE 5. Comparative levels of understanding of pertinence relations

	RANKS*		
characteristics	FARMERS	EXT. WORKERS	SCIENTISTS
fertilizer response	6	1	1
pest resistance	9	12	13
yield	2	4	3
plant height	14	10.5	6
price	7	5	7
lodging resistance	1	7	4
eating quality	8	2	2
disease resistance	13	10.5	11
tillering ability	3	3	5
maturity	4	8	10
grain weight	11	14	14
cost of production	11	13	12
threshability	11	9	9
dormancy	5	6	8

*Ranks are based on coefficients of concordance (W)

**between groups agreement:	FE	FS	ES
	r_s=.64 (.01)	r_s=.52 (.05)	r_s=.91 (.01)

**Based on Spearman rank order correlation coefficients.

TABLE 6. Summary of perceived agreements between farmers, extension workers and scientists

A. FARMERS' point of view:	FE	FS	ES
1. total number of characteristics	1.00 (2.5)	1.00 (2.5)	0 (1)
2. average number of characteristics	.36 (2)	.37 (3)	.01 (1)
3. types of characteristics	18.00 (2)	26.00 (3)	12.00 (1)
4. predicted future rice yields	23.00 (1)	60.00 (3)	37.00 (2)
5. total number of problems	1.00 (1.5)	1.00 (1.5)	2.00 (3)
6. average number of problems	1.34 (3)	.04 (1)	1.10 (2)
7. types of problems	88.00 (1)	129.00 (3)	103.00 (2)
TOTAL:	132.7	217.42	155.11
8. ranking of characteristics	.93 (2)	.92 (3)	.99 (1)
9. ranking of varieties	.20 (3)	.90 (1)	.40 (2)
TOTAL:	(18)	(21)	(15)

B. EXTENSION WORKERS' point of view:	FE	FS	ES
1. total number of characteristics	1.00 (2.5)	0 (1)	1.00 (2.5)
2. average number of characteristics	1.45 (3)	.45 (1)	1.00 (2)
3. types of characteristics	32.00 (2.5)	13.00 (1)	32.00 (2.5)
4. predicted future rice yields	4.00 (1)	37.00 (3)	33.00 (2)
5. total number of problems	2.00 (3)	1.00 (1.5)	1.00 (1.5)
6. average number of problems	.55 (1)	1.40 (2)	1.45 (3)
7. types of problems	19.00 (1)	51.00 (3)	48.00 (2)
TOTAL:	60.00	130.85	117.45
8. ranking of characteristics	.92 (1)	.62 (3)	.71 (2)
9. ranking of varieties	1.0 (1)	.50 (2.5)	.50 (2.5)
TOTAL:	(16)	(18)	(20)

C. SCIENTISTS' point of view:	FE	FS	ES
1. total number of characteristics	0 (2)	0 (2)	0 (2)
2. average number of characteristics	1.47 (2.5)	1.47 (2.5)	0 (1)
3. types of characteristics	17.00 (2.5)	17.00 (2.5)	0 (1)
4. predicted future rice yields	2.00 (1)	3.00 (2)	5.00 (3)
5. total number of problems	4.00 (3)	2.00 (1.5)	2.00 (1.5)
6. average number of problems	1.50 (3)	.66 (1)	.84 (2)
7. types of problems	68.00 (2)	78.00 (3)	41.00 (1)
TOTAL:	93.97	102.13	48.84
8. ranking of characteristics	.93 (1)	.64 (3)	.85 (2)
9. ranking of varieties	.90 (1.5)	.80 (3)	.90 (1.5)
TOTAL:	(18.5)	(20.5)	(15)

TABLE 7. Summary of farmers', extension workers' and scientists' accuracy

A. THE FARMER:	FE	FS	ES
1. total number of characteristics	6.00 (1)	16.00 (2)	
2. average number of characteristics	4.58 (1)	6.64 (2)	
3. types of characteristics	35.00 (1)	126.00 (2)	
4. predicted future rice yields	56.00 (1)	146.00 (2)	
5. total number of problems	10.00 (2)	7.00 (1)	
6. average number of problems	3.18 (2)	2.09 (1)	
7. types of problems	105.00	110.00 (2)	
TOTAL:	269.76	413.73	
8. ranking of characteristics	.77 (1)	.52 (2)	
9. ranking of varieties	0 (2)	.80 (1)	
TOTAL:	(12)	(15)	

B. THE EXTENSION WORKER:	FE	FS	ES
1. total number of characteristics	4.00 (1)		11.00 (2)
2. average number of characteristics	2.77 (1)		3.05 (2)
3. types of characteristics	65.00 (1)		75.00 (2)
4. predicted future rice yields	37.00 (1)		86.00 (2)
5. total number of problems	6.00 (2)		1.00 (1)
6. average number of problems	1.84 (2)		1.66 (1)
7. types of problems	90.00 (1)		92.00 (2)
TOTAL:	206.61		269.71
8. ranking of characteristics	.54 (1)		.12 (2)
9. ranking of varieties	.30 (2)		.80 (1)
TOTAL:	(12)		(15)

C. THE SCIENTIST:	FE	FS	ES
1. total number of characteristics		15.00 (2)	10.00 (1)
2. average number of characteristics		4.80 (2)	2.05 (1)
3. types of characteristics		123.00 (2)	77.00 (1)
4. predicted future rice yields		83.00 (2)	48.00 (1)
5. total number of problems		6.00 (2)	2.00 (1)
6. average number of problems		1.39 (2)	.85 (1)
7. types of problems		171.00 (2)	82.00 (1)
TOTAL:		404.19	221.9
8. ranking of characteristics		.27 (2)	.71 (1)
9. ranking of varieties		.90 (1)	.70 (2)
TOTAL:		(17)	(10)

SUMMARY

between groups accuracy:

FARMERS	: 269.76 (12)	+ 413.73 (15)		= 683.49 (3)
EXTENSION WORKERS:	206.61 (12)	+	269.71 (15)	= 476.31 (1)
SCIENTISTS	:	404.19 (17)	+ 221.90 (10)	= 625.09 (2)

TABLE 8. Length of experience and extension worker accuracy about farmers

	E - F accuracy	
1. Average number of characteristics perceived as relevant to varietal selection.	2.77	all extension workers
	2.07	high experience
	3.43	low experience
*2. Ranking of varietal characteristics.	.54	all extension workers
	.75	high experience
	.54	low experience
*3. Ranking of varieties	.30	all extension workers
	.79	high experience
	-.50	low experience
4. Yield predictions	37	all extension workers
	16.5	high experience
	50.2	low experience

*Based on Spearman rank order correlation coefficients - higher numbers indicate greater accuracy. The other two based on "D-scores" so smaller numbers indicate greater accuracy.

TABLE 9. Nationality and the scientists' accuracy about farmers and extension workers

S - F	ACCURACY	S - E
1. Ranking of varieties		
.90	all scientists	.70
.90	Filipino only	.80
2. Ranking of characteristics		
.27	all scientists	.71
.34	Filipino only	.63
3. Yield predictions		
83	all scientists	48
80.5	Filipino only	45

TABLE 10. Nationality and the scientists' agreement with farmers and extension workers

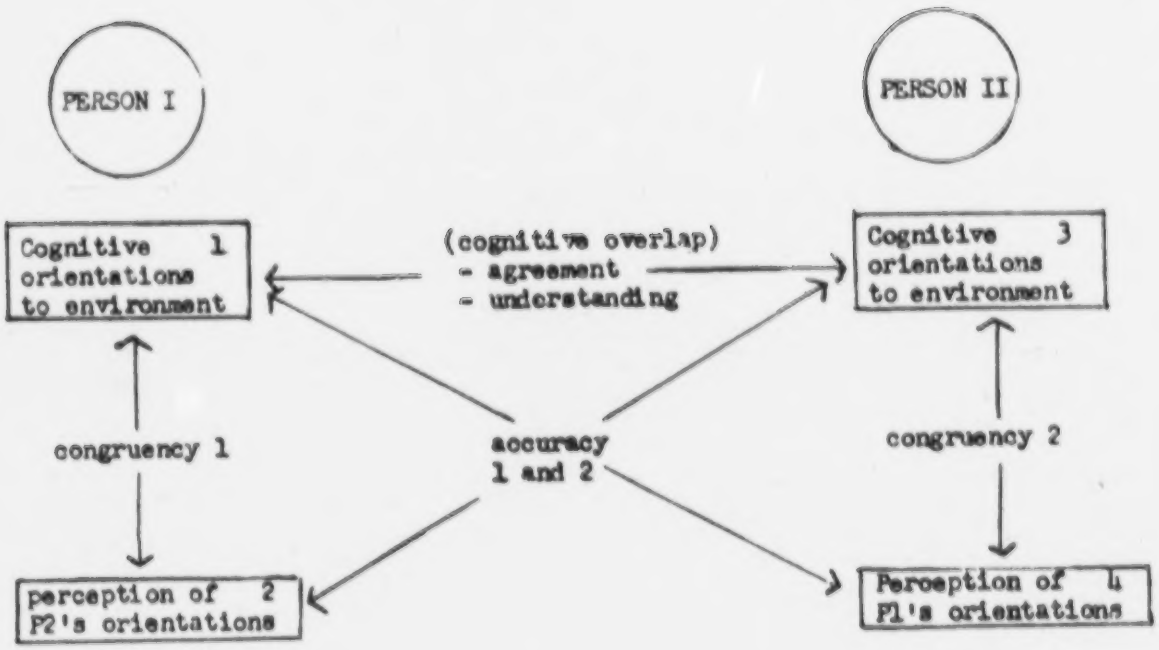
S - F	AGREEMENT	S - E
1. Ranking of characteristics		
.66	all scientists	.60
.82	Filipino only	.62
2. Ranking of varieties		
.60	all scientists	.40
.43	Filipino only	.37
3. Yield predictions		
86	all scientists	53
75.5	Filipino only	47.5

TABLE 11. Length of experience and extension worker agreement with farmers

1. Ranking of varieties	.30	all extension workers
	.30	high experience
2. Ranking of characteristics	.84	all extension workers
	.77	high experience
3. Yield predictions	33	all extension workers
	38	high experience

Figure 1

THE COORIENTATION MODEL

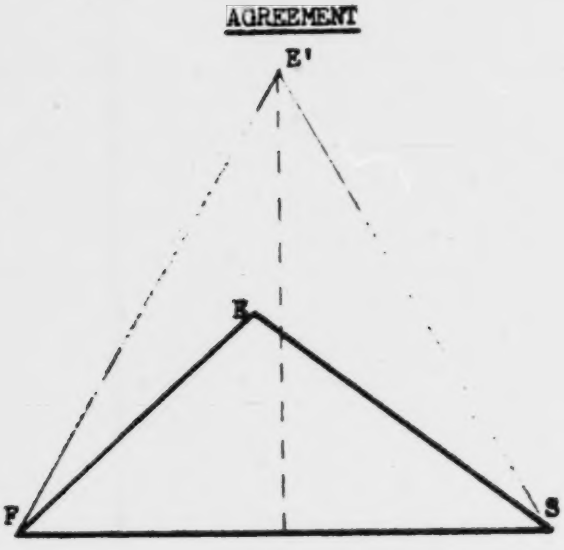


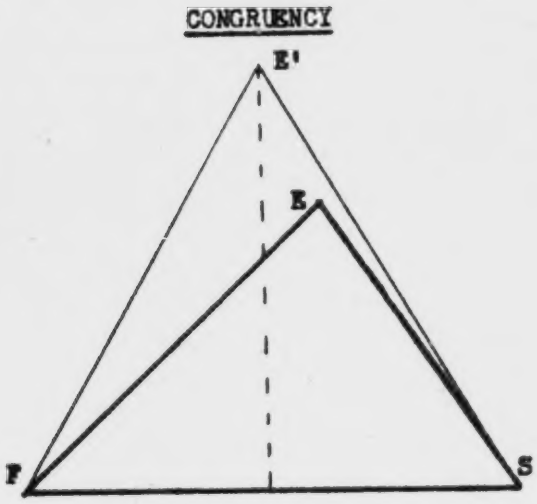
Four criterion variables:

Accuracy	: 1=4; 2=3
Congruency	: 1=2; 3=4
Agreement	: 1=3
Understanding	: 1=3

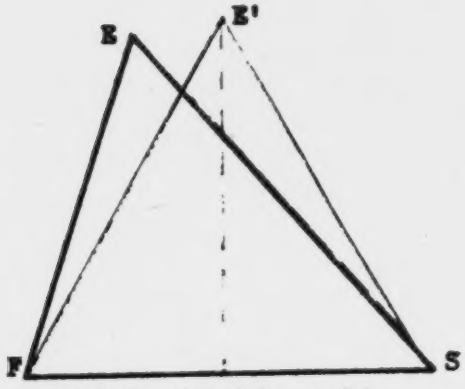
Figure 3

Coorientation Summary

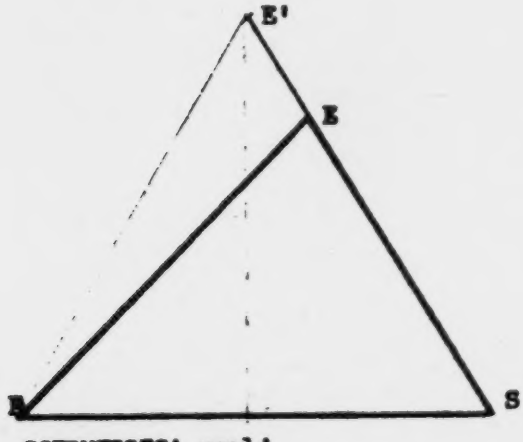




FARMERS' world



EXTENSION WORKERS' world



SCIENTISTS' world